(Substitute Specification)

MIRROR GLASS ASSEMBLY HAVING INTEGRATED LUMINESCENT FILM

Background Art

1. Field of the Invention

[0001] The invention relates to a vehicle external mirror module having a mirror glass. More particularly, the invention relates to a vehicle external mirror module having a mirror glass and a luminescent element attached thereto.

2. Description of the Related Art

[0002] An external mirror of this type is known from DE 103 27 072. A heating film is situated behind the mirror glass, which projects beyond the meandering heating element laid thereon. LEDs, whose light exits in front of the front side of the mirror glass, are attached to the projecting part of the film, which is additionally guided around the edge of the mirror glass. Such projections of the film require additional space, limitations on contour design, and increase material costs.

Summary of the Invention

[0003] A vehicular external mirror module includes a mirror housing. A mirror glass is housed within the mirror housing. The mirror glass includes a non-mirrored surface facing out of the mirror housing and a mirrored surface facing the mirror housing. The vehicular external mirror module also includes a luminescent film fixedly secured to the mirror surface of the mirror glass. The luminescent film emits light out from the luminescent film through the mirror glass.

Brief Description of the Drawings

[0004] Advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

[0005] Figure 1 is a side view, mirror side, of one embodiment of the invention;

[0006] Figure 2 is a cross-sectional top view, partially cut away, of the invention;

[0007] Figure 3 is a side view of a heating film incorporated into one embodiment of the invention;

[0008] Figure 4 is a cross-sectional side view, partially cut away, of the invention; and

[0009] Figure 5 is a side view, mirror side, of an alternative embodiment of the invention having multiple luminescent films.

Detailed Description of the Preferred Embodiments

[0010] Figure 1 shows a vehicle external mirror module. The vehicular external mirror module includes a mirror housing 1, a mirror glass 11, and a mirror base cover 3 of a mirror base (not shown).

[0011] A partial section oriented transversely to the mirror glass 11 is shown in Figure 2. A mirror glass module 10 is enclosed here laterally and on the back by the mirror housing 1 and an enclosure 2, which is engaged or glued therewith. The mirror glass module 10 is typically mounted so it is adjustable in the mirror housing 1. For this purpose, this mirror glass module 10 is seated with play inside the enclosure 2.

[0012] As shown in Figure 2, the mirror glass module 10 includes a mirror glass support 50, an adhesive film 40, a heating film 20 having a integrated luminescent film 61, and a mirror glass frame 51. The mirror glass 11 is attached to the mirror glass support 50 using an adhesive film 40 and a heating or combination film 20, which is also adhesive. By way of example, the adhesive film 40 is a microcellular rubber or another thin-walled elastomer body equipped on

both sides with an adhesive layer. During the mounting, the adhesive layer 40 of the combination film 20 is glued onto a back side 13 of the mirror glass 11. The adhesive film 40 is applied in turn to the combination film 20, in order to bond the mirror glass 11 to the mirror glass support 50.

[0013] The mirror glass frame 51 encloses the mirror glass support 50 to mechanically secure the mirror glass 11 on the mirror glass support 50. For this purpose, the mirror glass frame 51 has an outer edge section 54, which presses against the outer contour of the mirror glass support 50 and projects beyond the mirror glass exterior 12 toward the front. The outer edge section 54 encloses an angle less than or equal to 90° with the mirror glass exterior 12. A few millimeters in front of the mirror glass exterior 12, the mirror glass frame 51 passes into a section 53 which is oriented parallel to the mirror glass exterior 12. This section 53 passes into an inner edge section 52 which comes to rest on the mirror glass exterior 12 at approximately 90°. The mirror glass frame 51 and the mirror glass support 50 may be permanently welded or glued to one another.

[0014] Figure 3 shows a combination film 20 having a heating web 30, an integrated luminescent film 61, a transmitted light orientation film 70, two printed conductors 31, 32, and a connection plug 35. The combination film 20 has a wall thickness of approximately 0.3 to 0.5 mm. The film thickness is predefined for this purpose by the luminescent film component. Since the heating web 30 and the luminescent film 61 have a shared terminal strip 38 (or a shared plug), the connection of the external mirror module to the vehicle is additionally simplified.

[0015] The luminescent film 61 is an electroluminescent film in a flexible or rigid embodiment, which is equipped at least toward the mirror glass 11 with a self-adhesive layer as a part of the heating film 20. In the area in which the luminescent film 61 is positioned, the mirroring is semitransparent, i.e., it allows the cold light generated behind the back 13 of the mirror glass 11 in the luminescent film 61 to shine through nearly unobstructed, while the transparency resulting due to the semitransparency is not perceived by the driver looking into the rearview mirror. This applies at least for the operating state in which the luminescent film 61 is

not powered. The area of the semitransparent window 18 of the mirroring is smaller than the light-emitting area of the luminescent film 61. The edge of the light-emitting area is behind the completely mirrored area of the mirror. While this area is shown as a rectangular area, it should be appreciated by those skilled in the art the area may have other shapes or may form symbols and/or characters.

[0016] The color of the light of the particular luminescent film 61 may be tailored to the intended purpose.

[0017] A transmitted light orientation film 70 is situated between the luminescent film 61 and the mirror glass 11 in the exemplary embodiment shown in Figures 2 and 3. This film, whose area is also larger than the light-emitting area of the luminescent film 61, is a transparent plastic film whose thickness is less than 1 mm, cf. Figure 4. Microlamellae 71, which are oriented parallel to one another, are situated in the film. The microlamellae 71 have a wall thickness which is in the range of a hundredth of a millimeter. Their distance to one another is 10 times their thickness. The microlamellae 71 enclose an angle of 60° with the face of the mirror back 13. Accordingly, the primary light exit direction corresponds to the direction of the arrows 72. Depending on the intended use, the angle may be in a range from 30° to 90°. This angle of individual lamellae areas to one another may vary within a transmitted light directional opening. The opening angle 73 between two neighboring microlamellae 71 is typically 30° to 40°.

[0018] Figure 5 shows the front of a combination film 20 having multiple integrated luminescent film areas 61-63, without heating web, printed conductors, and connection plug. The luminescent film 61 is used here as a signal light for indicating a change of travel direction. A transmitted light orientation film is placed in front of it, whose microlamellae are oriented from top to bottom. The microlamellae enclose an angle of 20 to 80° with the mirror glass surface 12 - measured in a plane parallel to the roadway surface. A light direction 65 which is primarily oriented to the rear and also to the side facing away from the vehicle, for example, results through this orientation. As a result, the signal light is well visible to traffic located to the rear

and traveling past. The driver cannot perceive the signaling because of the microlamellae orientation.

[0019] In addition to the rectangular luminescent film 61, for example, a luminescent film 62 provided as an indicator light is also located on the bottom. Its light direction 66 is oriented toward the driver. For this purpose, the transmitted light orientation film in front of it has a small lamellar angle of approximately 30° to 40° in relation to the mirror glass surface. The traffic to the rear does not perceive the light of the indicator lights. By using the microlamellae, the indicator light may still be perceived well even in bright sunlight. Via the indicator light, which may include multiple differently shaped and separately activatable luminescent film areas - in the form of symbols or writing - information of the electronic lane change system and/or the blind spot monitor may be communicated to the driver.

[0020] A luminescent film 63, which fulfills the function of a background light, is situated in the upper mirror area. It makes getting in and out of the vehicle easier in the dark, for example, in that it illuminates the roadway surface next to the driver and/or passenger doors. The light direction 67 is directed downward for this purpose. As a result, the traffic to the rear is not disturbed.

[0021] In the exemplary embodiment, the heating web 30, shown in Figure 3, has two meandering sections in the middle area of the mirror. It 30 ends on the mirror back in the left, lower area in the connection plug 35. Instead of a connection plug 35, the printed conductors 31, 32 and the heating web 30 may also end in individual contact tabs, to which power is then supplied in the vehicle external mirror module via springy contact bridges if necessary.

[0022] The printed conductors 31, 32 run largely parallel to the edge 23 of the combination film 20. They are applied here on the side of the combination film 20 on which the heating web 30 is situated. Of course, there is also the possibility of attaching the individual printed conductors and heating web in different, electrically insulated levels of a multilayered combination or heating film 20.

[0023] In addition, ballasts for the light elements or parts of the electronic controller of the mirror adjusting drives may be situated on the combination film 20, e.g., in edge areas. If necessary, the combination film may be reinforced in some areas to receive discrete electronic components, such as ICs.

[0024] Notwithstanding the exemplary embodiments, the luminescent film 61 may also be attached separately to the mirror back 13 together with the printed conductors 31, 32 – which are possibly also applied to a film. This is the case when the external mirror is not heated, for example.

[0025] The invention has been described in an illustrative manner. It is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation.

[0026] Many modifications and variations of the invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the invention may be practiced other than as specifically described.